

“Flicker”

electric power perspective on the word...



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The word “Flicker” has different meanings in lighting, electric power communities

- Electric power – “flicker” is tiny variations in voltage (not light)
 - $\pm 10\%$ voltage limits are typical
 - Much smaller ($\pm 0.5\%$) voltage variations, through incandescent lights, are annoying if the frequency of variation is a few cycles per second
 - “Flicker” problem is associated with specific sources and loads



Arc furnaces



Rock crushers

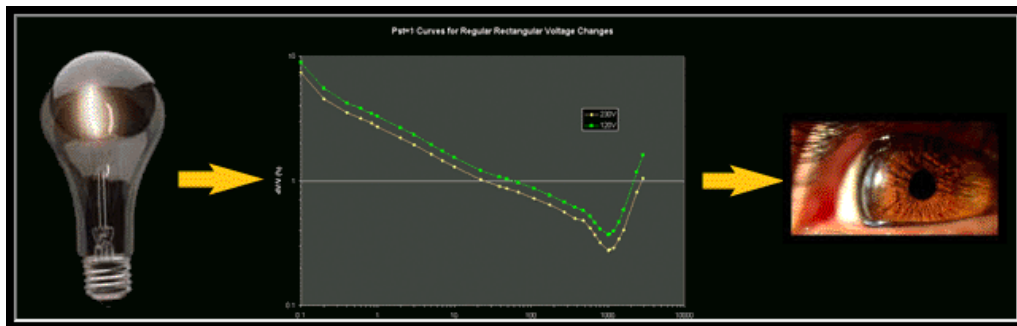


Axis-aligned wind turbines

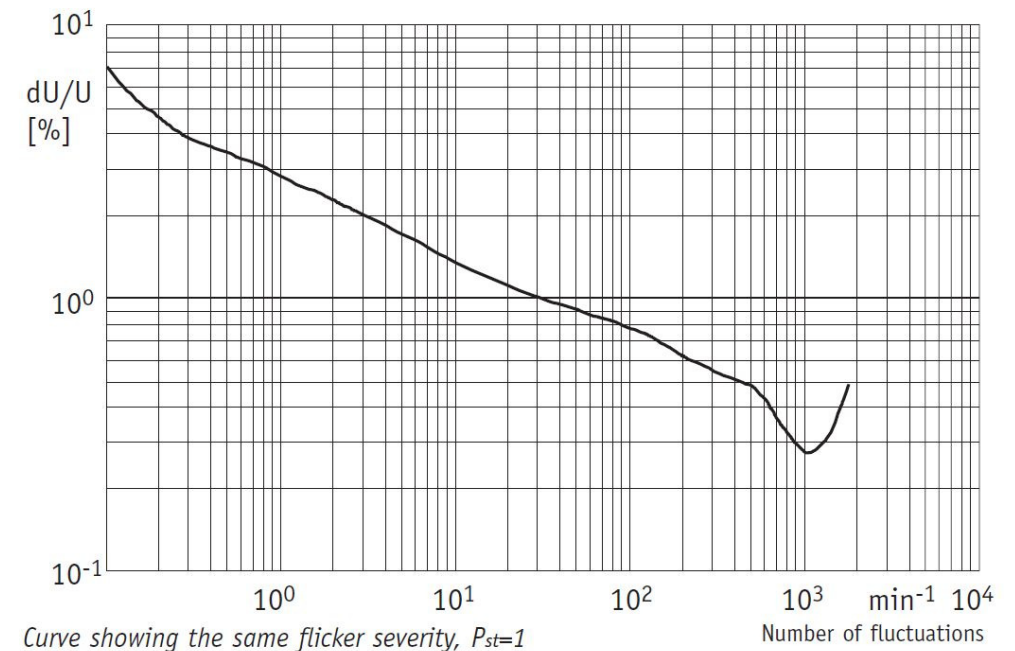
Image source: all Wikipedia.org

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- Algorithm curves based on voltage variation magnitude, frequency
 - Derived from old studies
 - Assume 60W incandescent bulbs (!), male undergraduate Western Europe eyes
 - Bigger value means worse flicker.
 - Value of 1.0 means that 50% of “population” is aware of it

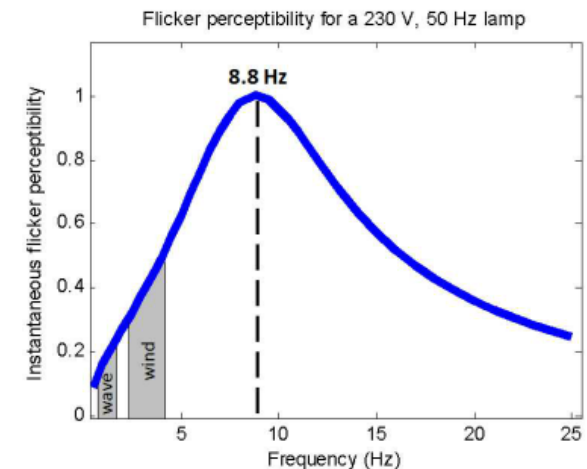
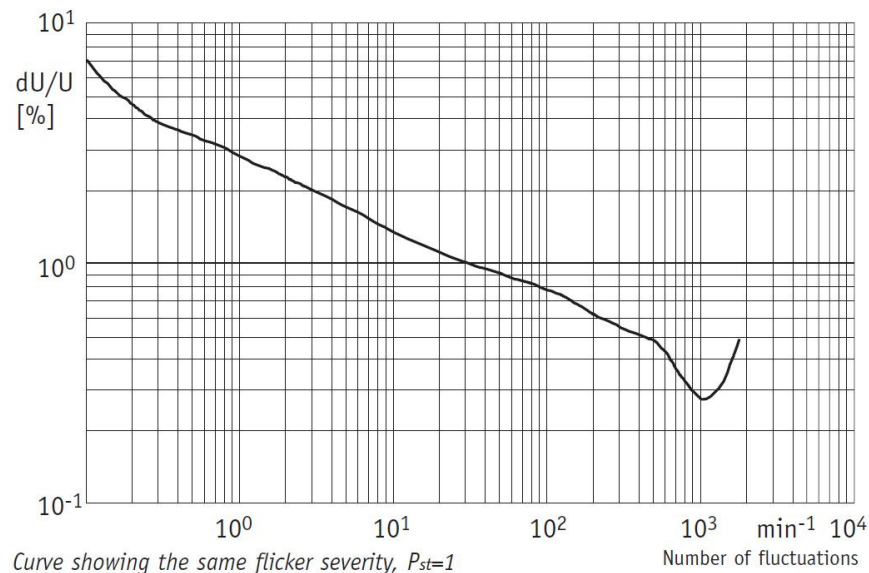


Google “Power Quality Teaching Toy” for free download



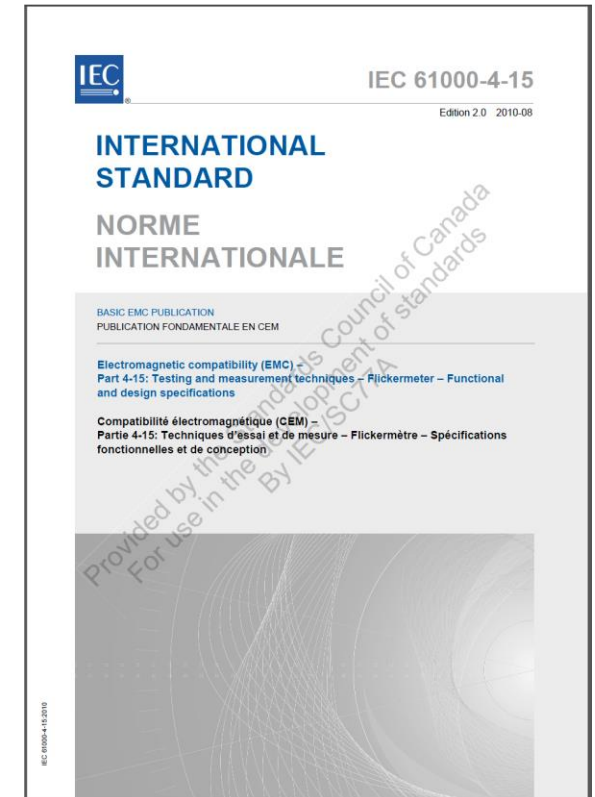
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- Utilities talk about three (voltage) flicker measurements: P_{INST} , P_{ST} , P_{LT}
 - “P” for “butterfly” in French – *papillon*
 - P_{INST} – Instantaneous flicker – no regulations
 - P_{ST} – Short-term flicker – 10 minute average – typically 95% less than 1.0
 - P_{LT} – Long-term flicker – 2-hour average – typical limit 95% less than 1.0



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- Utility Standards for flicker
 - IEC 61000-4-15 - Testing and measurement techniques – Flickermeter – Functional and design specifications
 - IEEE 1453 is the IEEE equivalent...
 - IEC 61000-3-3, -11 Limits – voltage changes, voltage fluctuations and flicker in public low-voltage supply systems
 - Japan, Korea have different standards
 - IEC is in general proscriptive, IEEE is in general descriptive



Key take-aways...

- When you talk with your utility about “flicker”, they may use the same word for a different meaning.
- Voltage variations, called “flicker”, are related to light emissions through algorithms and Standards that assume 60-watt incandescent bulbs.
- Still, these Standards are well-established, practical, and useful.
- More information, discussion: Alex@PowerStandards.com



Image source: Wikipedia.org



Image source: www.PQube3.com

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